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ABSTRACT

This paper reviews research studies concerning the effectiveness of varying strategies for teaching questioning skills and groups them into the following organizational scheme: (a) study of question classification systems as a strategy for teaching questioning skills, (b) use of laboratory experiences as a strategy for teaching questioning skills, (c) materials designed to teach questioning skills, (d) impact of feedback strategies on teaching questioning skills, and (e) miscellaneous inservice strategies for teaching questioning skills. A common element in the training strategies was the objective of raising the cognitive level of teachers' questions. Although the studies reviewed represent breadth in terms of pupil characteristics and subject matter, elementary classrooms and social studies instruction were the predominant settings. These studies varied from highly controlled ones to exploratory investigations and evaluated a variety of instructional procedures and materials, making it difficult to draw sharp conclusions. There is a tentative indication that strategies that employ model inputs accompanied by feedback and self-analysis are the most promising. Further research is needed in the areas of teacher training and the relationship between teacher questioning and pupil growth. Such knowledge can then be applied to the search for effective teacher training strategies. A 50-item bibliography is included. (PD)

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TEACHER TRAINING FOR EFFECTIVE QUESTIONING

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"Questions are the stock-in-trade of teachers" (Sanders, 1966). This view of the importance of teacher questioning finds support in a growing body of literature concerned with classroom interaction. In addition, we need only a brief visit in the classroom to be reminded of the significant role questions play.

CONCERN FOR TEACHER QUESTIONING IN PERSPECTIVE

The primary thrust of this paper is a review of research concerned with the training of teachers in questioning skills. However, it seems appropriate to initially set that concern in the framework of the larger issue of teacher-questioning practices and their impact on pupil learning. The importance of teacher questioning was raised in both research (Stevens, 1912) and opinion (Hall, 1916) prior to World War I and was studied more than three decades ago by Haynes (1935) and Corey (1940). However, major research interest in the area is recent if judged by the volume of studies reported in the literature.

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Clues to the probable antecedents of current research interest in questioning can be found in an examination of the major focus and design of recent studies of teacher questioning. Investigations of general classroom interaction through the use of systematic observation by Flanders (1960), Smith and Meux (1962), Hughes (1963), and Gallagher and Aschner (1963), among others, both sharpened the focus on questioning as a significant part of that interaction and provided insight for the development of instruments for use in the study of questioning.

Paralleling developments in systematic observation was a heightened interest in the cognitive processes in classrooms. The Bloom et. al. (1956) Taxonomy of Educational Objectives influenced the style and direction of much of the thought and study in this area.

Recent research in teacher questioning directly reflects the development described above. The principle concern of the work in questioning has been the relationship between the cognitive level of questions asked by teachers and the thinking processes employed by students, and for that purpose, a number of instruments have been designed. A substantial portion of the investigations of teacher questioning have employed the Bloom (1956), Aschner (1961) or

Sanders (1966) category systems directly or have used instruments derived from them. Other instruments or analysis systems employed in continuing research include Davis and Tinsley (1967), Parsons and Shaftel (1967) and Clegg (1967). Gall (1970) presents a comparative analysis of eight question classification systems.

Work has also been done on the sequencing of questions. Taba and Elzy (1964) and Oliver and Shaver (1966) give careful consideration to the relationship between question sequence and the cognitive processes elicited.

Other dimensions of teacher questioning such as question content and processes for enhancing pupil participation have received less interest. However, Parsons and Shaftel (1967), Gall (1970), Carin and Sund (1971) and Hunkins (1972) report research and express opinion concerning the need to explore these areas more comprehensively.

The strongest generalization to come out of the research on teacher questioning is that teachers ask a large number of questions and the greatest portion of these elicit responses which represent simple recall of information (Stevens, 1912; Floyd, 1960; Adams, 1964; Davis and Hunkins, 1966; Parsons and Shaftel, 1967; Davis and Tinsley, 1967; Godbold, 1968; Crump, 1969; Tinsley, Watson and Marshall, 1970). This

description of current questioning practices and a belief that teachers ought to ask questions at higher cognitive levels provides the condition for research intended to design and evaluate instructional procedures for teaching questioning skills.

TEACHER TRAINING.

Developing an organizational scheme for reviewing and reporting research studies concerning the effectiveness of varying strategies for teaching questioning skills presents difficulties. Therefore, the organizational scheme adopted here is an arbitrary one which recognizes that distinctions may be blurred.

Study of Question Classification Systems as a Strategy for Teaching Questioning Skills

In the investigations reviewed under this topic, the principle problem addressed is: Does the study of a classification system contribute to the acquisition of questioning skills? Clegg and Farley (Clegg, 1967; Farley and Clegg, 1969) measured the effect of the study of Bloom's (1956) Taxonomy on the cognitive level of questions asked by student teachers during social studies instruction. Clegg (1967) reports that training in Bloom's Taxonomy (1956) did not result in a significant difference in the number of higher cognitive

level questions asked by six student teachers. He concludes, however, that there was change in that direction and the lack of significance resulted from an insufficiently sensitive pre and post test instrument. Farley and Clegg (1969) found that six elementary student teachers trained in the Bloom Taxonomy (1956) through a series of once a week sessions during student teaching achieved higher cognitive level behavior during social studies instruction than did a control group.

Six hours of question classification and design resulted in an increase in the number of "divergent and evaluation" questions and a decrease in the total number of questions asked by science teachers in a study by Konetski (1969). Rogers (1969) reports that student teachers who participated in a series of seminars dealing with the use of varying cognitive level questions asked more higher level questions during a four day fifth grade social studies unit than did a control group.

Use of Laboratory Experiences as a Strategy for Teaching Questioning Skills

This section reviews studies which employed simulated teaching experiences or laboratory based self analysis as a strategy for developing questioning skills. Based on an

analysis of a final tape produced by student teachers during simulated teaching experiences, Morse (1969) reports that prospective teachers who participated in the laboratory experiences asked more higher cognitive level questions and reacted more positively to pupil responses than did a control group. Students in a social studies methods class who used Bloom's Taxonomy (1956) to analyze and prepare questions for micro-teaching and full class instruction were judged to have "a sharper than usual perception of questioning" (Olmo, 1970).

Parsons and Shaftel (1967) describe a teacher training strategy involving "Guided Self-Analysis" using video tapes of participant classroom questioning. Tapes were analyzed using a four category system, "rhetorical, recall, leading and probing." Comparison between first and second tapes revealed substantial shifts upward in the distribution of questions asked by the eighteen participating elementary teachers. Analysis of a third tape indicated continued movement from "rhetorical" to "recall" and "leading" questions but no increase in "probing" questions. Based on interviews with participants, the researchers concluded that the difficulty in increasing the number of "probing" questions resulted in part from the teacher's concept of the teaching role and the teacher's vague idea of what thinking is.

Firdings which indicate that "Guided Self-Analysis" (Parsons, 1968) is effective as a strategy for teaching questioning skills are reported by Birch (1969) and Aguon (1971). Birch (1969) reports findings from a study of the effects of "Guided Self-Analysis" on the behavior of forty student teachers in grades three through six. These findings indicate that self-analysis was effective in decreasing the frequency of such negatively valued teacher behaviors as rhetorical questions, basic questions, closure responses and instruction. Self-analysis was also effective in increasing positively valued teacher behaviors such as leading questions, probing questions, extending responses and questions and responses in general. The investigation conducted by Aguon (1971) involved fifty-eight in-service elementary teachers drawn from ten elementary schools on Guam. Teachers who experienced "Guided Self-Analysis" asked significantly more leading and probing questions than did teachers who experienced the usual University of Guam methods course approach with emphasis on the use of questions for inquiry development.

Materials Designed to Teach Questioning Skills

The studies reviewed here are ones in which instructional materials for training teachers in questioning were designed

and evaluated. In some instances, the study of classification systems or self analysis strategies are also involved.

Gall, et. al. (1970) report findings from an evaluation of "Mini Course 9: Higher Cognitive Questioning" developed by the Far West Regional Laboratory. A principle concern of this study was a comparison of the effectiveness of observation of video tape models of teachers employing classroom skills with the reading of transcripts from video tapes. Mini Course 9 represents fifteen hours of training time during four sessions. A field test involving fifty-four teachers produced the following results. The percentage of higher cognitive level questions increased for both video tape and written groups. There was a substantial decrease in the number of memory questions for both video tape and written groups. The number of "long" student responses increased by 25% for the video tape group and by 85% for the written group. On some other indices such as the use of "probing" questions, the written version was superior.

Olsen (1972) conducted a study to determine the effectiveness of materials designed to teach instructional questioning. Twenty students in a social studies methods class comprised the experimental and control groups. Results were based on an analysis of thirty minute lessions taught to second and third graders. Though there was no significant difference between experimental

and control groups, the experimental group asked fewer "memory" and "interpretation" questions and more "application" and "analysis" questions.

A study by Crump (1969) sought to determine the effectiveness of a self instructional programmed text designed to inform teachers of a questioning hierarchy and techniques to change their oral and written questions. Classroom tapes and tests produced by nineteen intermediate teachers were analyzed using a four category instrument. The programmed text did not result in a significant change in questioning practices. However, there was a decrease in the proportion of "reproduction and translation" questions from 89.19% to 73.4% accompanied by a small increase in "divergent" questions.

Douce (1971) employed "learning packages" (intended to raise the cognitive level of teacher questioning) during five two hour sessions over a three week period involving ten experienced teachers. When compared to a non-instructed control group, there was no significant difference in the number or level of questions asked. Four lesson booklets designed to increase the variety and cognitive level of questions employed in reading instruction were developed by Howard (1970). Questions written by experimental and control groups in a reading methods course were analyzed using an instrument designed for

the study. The researcher reports that the experimental group wrote more "critical reading questions" but that the materials had only limited value in enhancing the use of questions in specific comprehension categories.

Godbold (1972)[1] developed an auto-instructional package involving three components of teacher questioning; (2) cognitive level of question, (b) question sequencing, and (c) pupil-teacher interaction. The basic instructional strategy involved written presentation of information pertinent to each of those components and structured self analysis of audio tape recordings of classroom performance. Instruments for teacher recording and analysis of question level and sequence and pupil response patterns were an integral part of the instructional design. As a result of schedule changes by the participating school district, the field test portion of the study was not completed. However, the clinical development portion involving four secondary social studies and language arts teachers produced some evidence of change in the desired direction. Three of the participants evidenced a decrease in the number of "memory" questions asked accompanied by a substantial increase in the number of "interpretation" questions and a slight increase in the use of "evaluation" questions. Examination of the pupil

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[1]Supported by a faculty research grant at East Texas State University

response profiles indicated an increase in the number of students responding. There was no evidence of change in question sequencing patterns. Review and rewriting of the instructional package is currently underway in anticipation of field testing.

Impact of Feedback Strategies on Teaching Questioning Skills

Several of the studies reviewed above involved some type of feedback to teachers concerning questioning performance. Studies reviewed here are those which focus specifically on the effect of varying feedback strategies.

Manson (1970) compared the effectiveness of three feedback procedures in increasing the use of higher order questions. The three feedback procedures were identified as (a) "self feedback", (b) "postponed informative feedback", and (c) "immediate informative feedback." Data for the investigation was gathered on the performance of thirty-six prospective teachers divided into four groups (three experimental and one control) during four thirty minute social studies lessons in elementary school classrooms. The participants experienced no performance inputs such as modeling, though an instrument for question classification was designed and used in the study. Participants in the "self feedback" group listened to their own tapes after each lesson. "Postponed

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informative feedback" participants listened to their tapes and received an audible "yes" from an observer each time a high order question was asked. "Immediate informative feedback" group participants received an audible "yes" from an observer through a wireless device during class instruction each time a higher order question was asked. The researcher concludes that "self feedback" provides too little information to change behavior. "Immediate" and "postponed informative feedback" did not have a differential effect on questioning behavior. Further conclusions were that the lack of information specificity, absence of model inputs and awareness of feedback contingencies may have influenced results.

Schmitt (1969) investigated the effects of immediate CATTS (Computer Assisted Teacher Training System) feedback on the questioning practices of prospective teachers of EMR pupils. The researcher reports that the six teachers who experienced the CATTS feedback spent more interaction time asking broad questions.

Miscellaneous Inservice Strategies for Teaching Questioning Skills

The investigations reviewed here share a common interest in determining the effectiveness of inservice programs intended to change teacher questioning behavior. Those inservice

programs investigated vary markedly in the strategies employed to obtain their objective.

Thirty-six American history teachers were divided into experimental and control groups in a study by Psencik (1971) to determine the effectiveness of an eighteen hour inservice program concerned with questioning skills. The findings indicated that the training program resulted in the teachers asking fewer "memory" questions and more questions above "memory."

Zoch (1971) compared the effectiveness of two individualized inservice programs intended to change the questioning behavior of kindergarten and first grade teachers. Audio tape recordings of thirty-four teachers in experimental and control groups were analyzed in terms of the cognitive level of questions asked. Following researcher analysis of tapes, each teacher was given an individualized set of written instructions for improvement. In addition, teachers in the experimental group received two hours of personal individualized instruction. Findings indicate that both groups increased the percentage of higher cognitive level questions asked and that the experimental group had a larger percentage of higher order questions than did the control group.

Trosky (1971) reports on the effects of a series of individualized supervisory conferences intended to increase

the use of higher cognitive questions by five teachers. Initial supervisory conferences were intended to make the teachers aware of cognitive levels and a latter conference involved self analysis. The conferences resulted in four of the teachers increasing the number of higher level questions asked.

Summary:

The investigations of teacher training strategies for developing questioning skills reviewed here do not produce clear cut generalizations. However, there may be merit in making some descriptive statements and attempting to identify tentative conclusions.

A common element in the training strategies was the objective of raising the cognitive level of teachers' questions. Although the studies reviewed here represent breadth in terms of pupil characteristics and subject matter, elementary classrooms and social studies instruction were the predominant settings. These studies varied from highly controlled ones to exploratory investigations and evaluated a variety of instructional procedures and materials making it difficult to draw sharp conclusions.

There appears to be evidence of considerable success in the reduction of the number of questions at the lowest

cognitive level. However, success in obtaining substantial and precise use of questions near the top of the cognitive hierarchy appears limited. This problem is discussed by Parsons and Shaftel (1967). There is a tentative indication that strategies which employ model inputs accompanied by feedback and self analysis are the most promising.

NEEDED RESEARCH

Further research is needed if questioning is to become a more effective instructional tool. Such research should concentrate on two general areas. One area is the determination of the relationship between teacher questioning patterns and instructional objectives. The other area is the design and evaluation of teacher training procedures for developing questioning skills.

Needed Research: Teacher Training

As previously stated, the primary concern of the teacher training strategies incorporated in the research reviewed here was the cognitive level of questioning. Research should be continued in this area. Attention must also be given to techniques for training teachers in other aspects of questioning such as the sequencing and pacing of questions, wording of questions to guide student responses and techniques for involving pupils.

Needed Research: Relationship Between Teacher Questioning and Pupil Growth

Continued development of training for questioning must be accompanied by research intended to determine optimal questioning strategies in terms of their contribution to instructional objectives (Godbold, 1968, 1970; Gall 1970). The following model (see Figure 1) is offered as a guide for posing questions concerning the relationship between the varying components of teacher questioning and impact on pupil learning.

Teacher questioning has an impact on three general areas of concern to instruction (a) development of pupil thinking, (b) pupil mastery of specific information and (c) establishment of a classroom climate conducive to pupil growth. As described in the model (Figure 1), the nature of that impact is determined by two interactive dimensions of questioning which may be examined independently. One of these dimensions is the question. The second incorporates the manner in which questions are employed. I refer to this latter dimension as the "questioning strategy." There appears to be support in the literature for this concept and the other elements of questioning the model identifies.

The "question" dimension is concerned with questions in isolation which may be described as having two components

FIGURE 1

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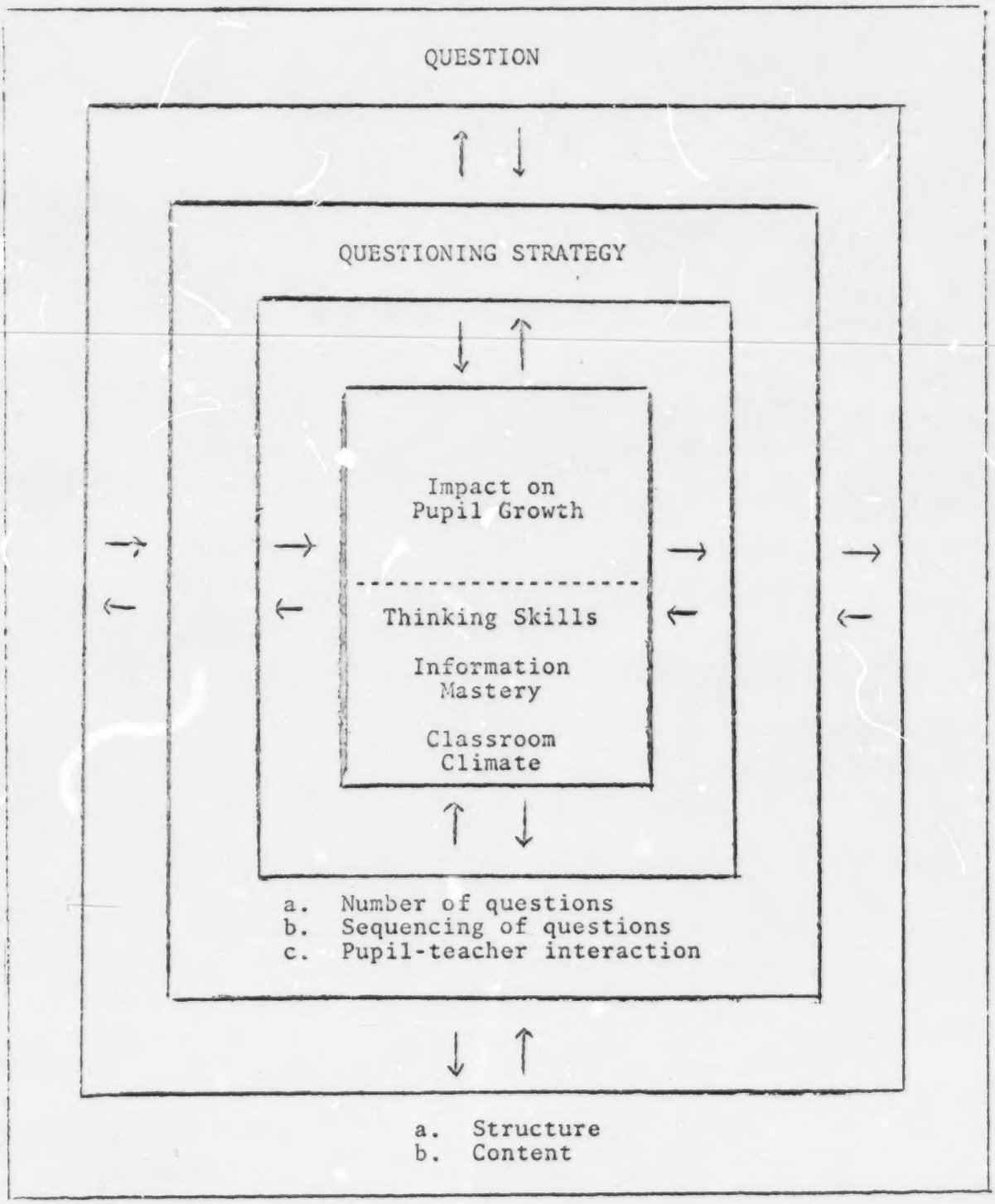
THE IMPACT OF TEACHER QUESTIONING ON PUPIL GROWTH: A TENTATIVE MODEL



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or elements "structure" and "content." As used in the model presented here, "structure" refers to the linguistic formulation or language of the questions. Smith and Meux (1962) indicate that the "logical operation" a question calls for is determined in some instances by the linguistic form of the question. In other instances, the use of a key word in the same linguistic form determines the desired operation. Clegg (1967) indicates that there is a "rhetoric" or "grammar of the interrogative." He believes that questions should contain "cues" to direct students to the desired response level.

"Content" is the second element of the question dimension and as used here refers to the subject matter under consideration. Gall (1970) indicates that there may be advantages to developing questioning strategies which are "curricula and situation specific." In my own study (Godbold, 1968, 1972), I observed that a judgment could be made as to the relative value of the content of a question irrespective of its cognitive level. Hall (1916), Wellington and Wellington (1962) and Postman and Weingartner (1969) express the belief that the most valid test of a good question is the degree to which it is worthy of an answer from the student.

As discussed above, the impact of teacher questioning on pupil growth is in part determined by the structure and content

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of the questions employed. However, questioning is more than a collection of questions. Hunkins (1972) expresses the view that questions do not exist in isolation, but are elements of questioning strategies. "Questioning strategy" is the second dimension of questioning in the model presented here and is composed of three elements, the number of questions, question sequence and the interaction between pupil and teacher.

These elements are identified and discussed in the literature. Stevens (1912) and Floyd (1960) concluded that a large number of questions asked in rapid succession were associated with a nervous tension in the classroom. My own observations indicate a possible relationship between the number and cognitive level of questions (Godbold, 1968).

A second element in the questioning strategy dimension of questioning is the "sequencing of questions." Question sequence as a factor contributing to the impact of a questioning strategy on pupil learning has been explored by Oliver and Shaver (1966) and Taba and Elzy (1966). Oliver and Shaver (1966) state that one of the differences between "recitation" and "socratic" teaching styles is the sequential factor involved in socratic teaching. The socratic style is characterized by initial emphasis in a discussion being given to factual questions with emphasis on value issues coming later.

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Taba and Elzy report that the sequence of questions in terms of cognitive level will determine the level of pupil responses. A random shift in levels results in students responding at the most primitive level.

The third element of a questioning strategy is the pattern of pupil-teacher interaction. The concern here is the manner in which student participation is elicited and reinforced. "Wait-time" (the elapsed time between the posing of a question and calling upon a student to respond) is one aspect of this interaction. Rowe (1969) reports research which indicates that an increase in wait-time (the previous average was one second) resulted in lengthened pupil responses, answers in whole sentences, speculative thinking, shift to child-child behaviors, increase in childrens' questions, increase in the variety of teacher questions and revised teacher expectations of pupils.

Another aspect of the pattern of teacher-pupil interaction during questioning is discussed by Taba (1967). She reported that a too high level of teacher control results in questioning which is really recitation. A level of teacher control which is too low results in a free flow of ideas and information which is chaotic.

Obviously, the aspects of wait-time and level of teacher control do not represent the whole of the teacher-pupil

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interaction element. They are presented here as illustrative of the concerns of this element. Research is needed to define other aspects of the pupil-teacher interaction element of questioning.

Summary

In summary, the model presented here attempts to express the concept that teacher questioning has an impact on three concerns of pupil learning. The precise nature of that impact results from the interplay of the various elements of teacher questioning. Further research is needed to determine the relationship between desired outcomes and specific teacher questioning patterns. Such knowledge can then be applied to the search for effective teacher training strategies.

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